

Supplementary Materials for
"Methodology for lidar monitoring of biomass burning
smoke in connection with the land cover "

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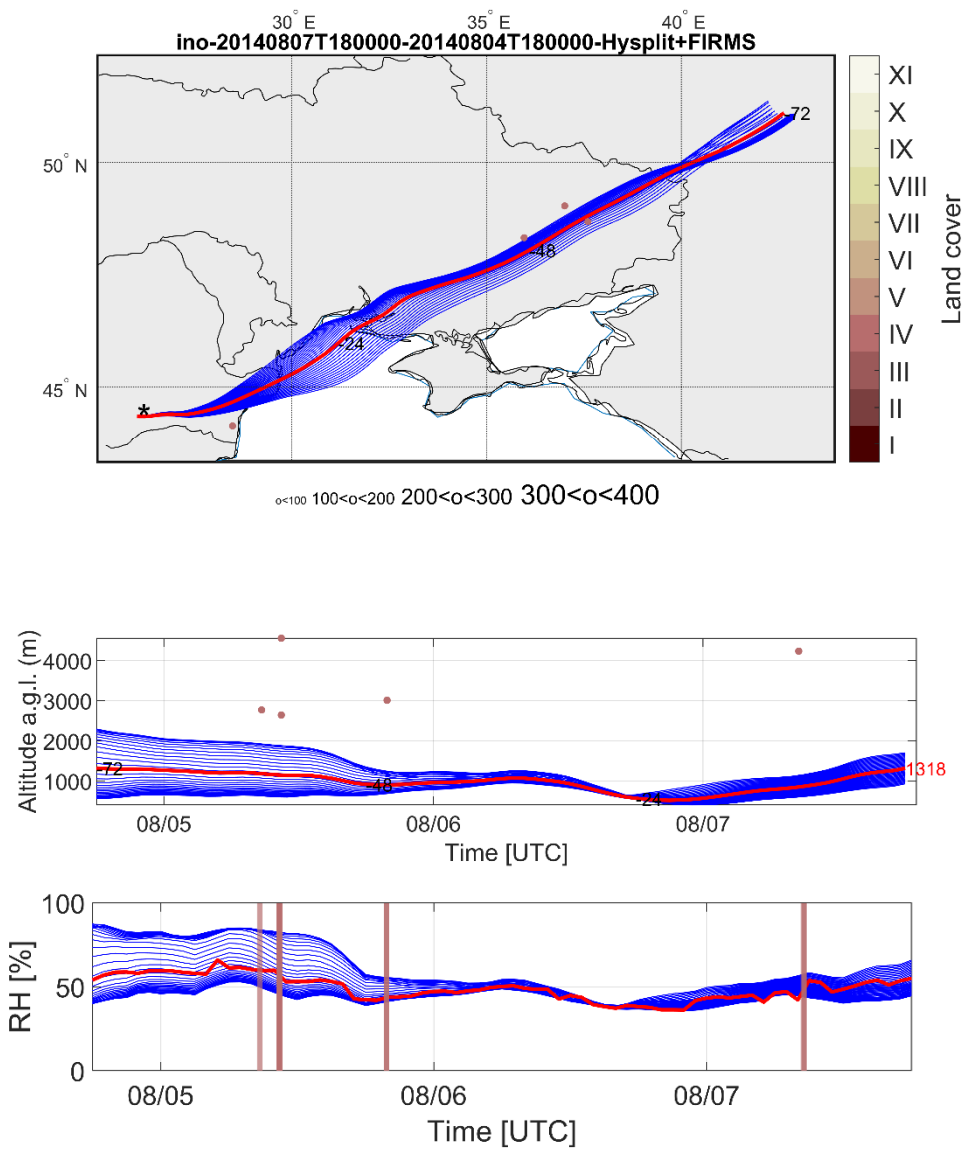
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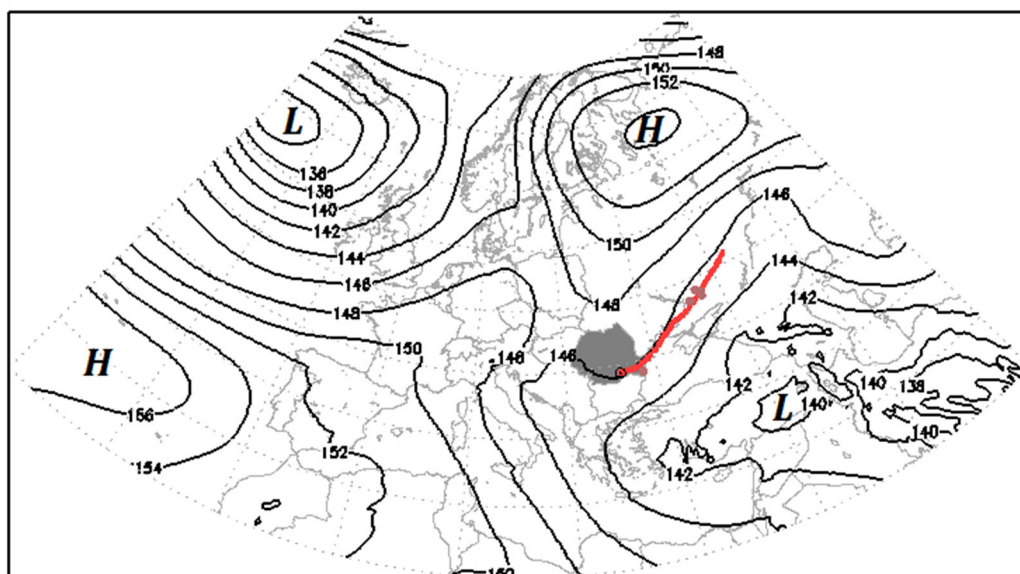
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- Figures S1-S15

(a)



(b)



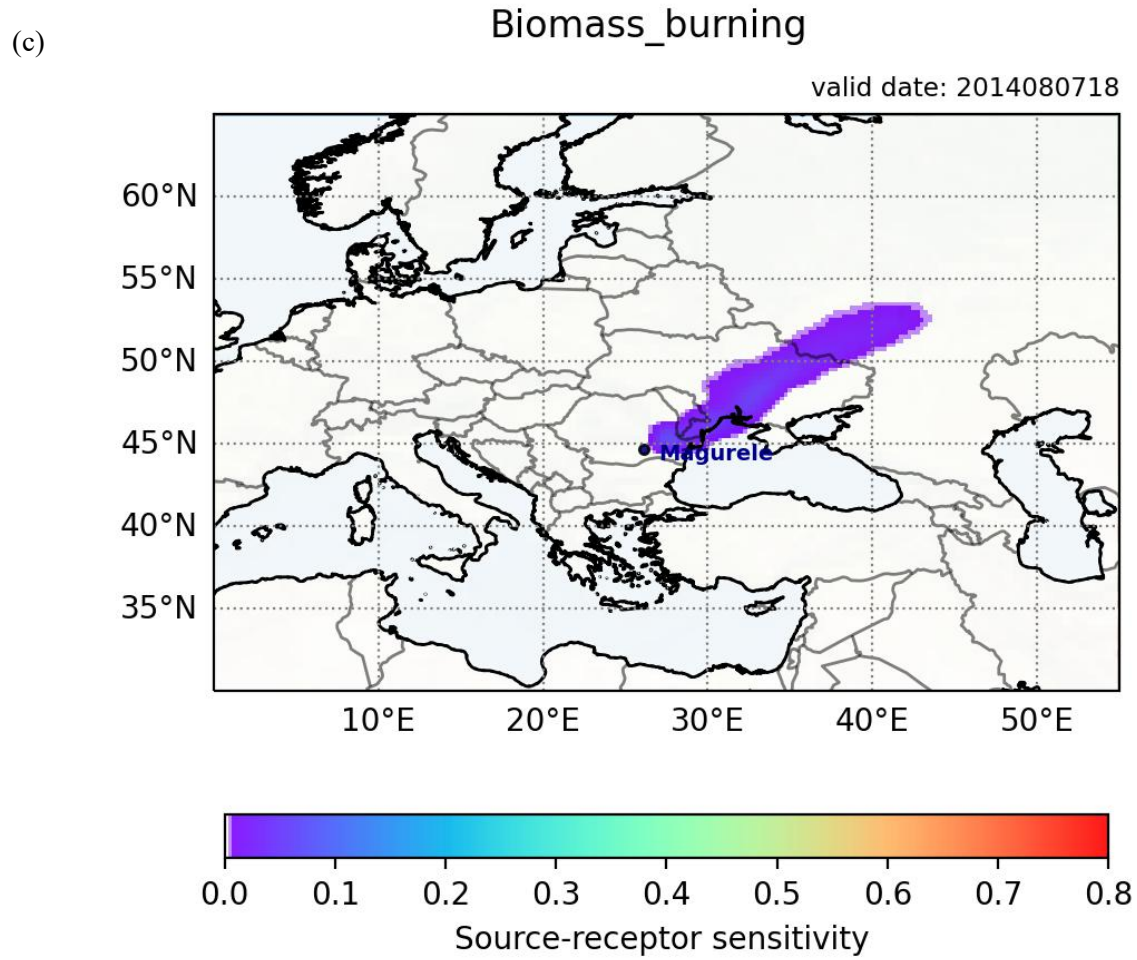
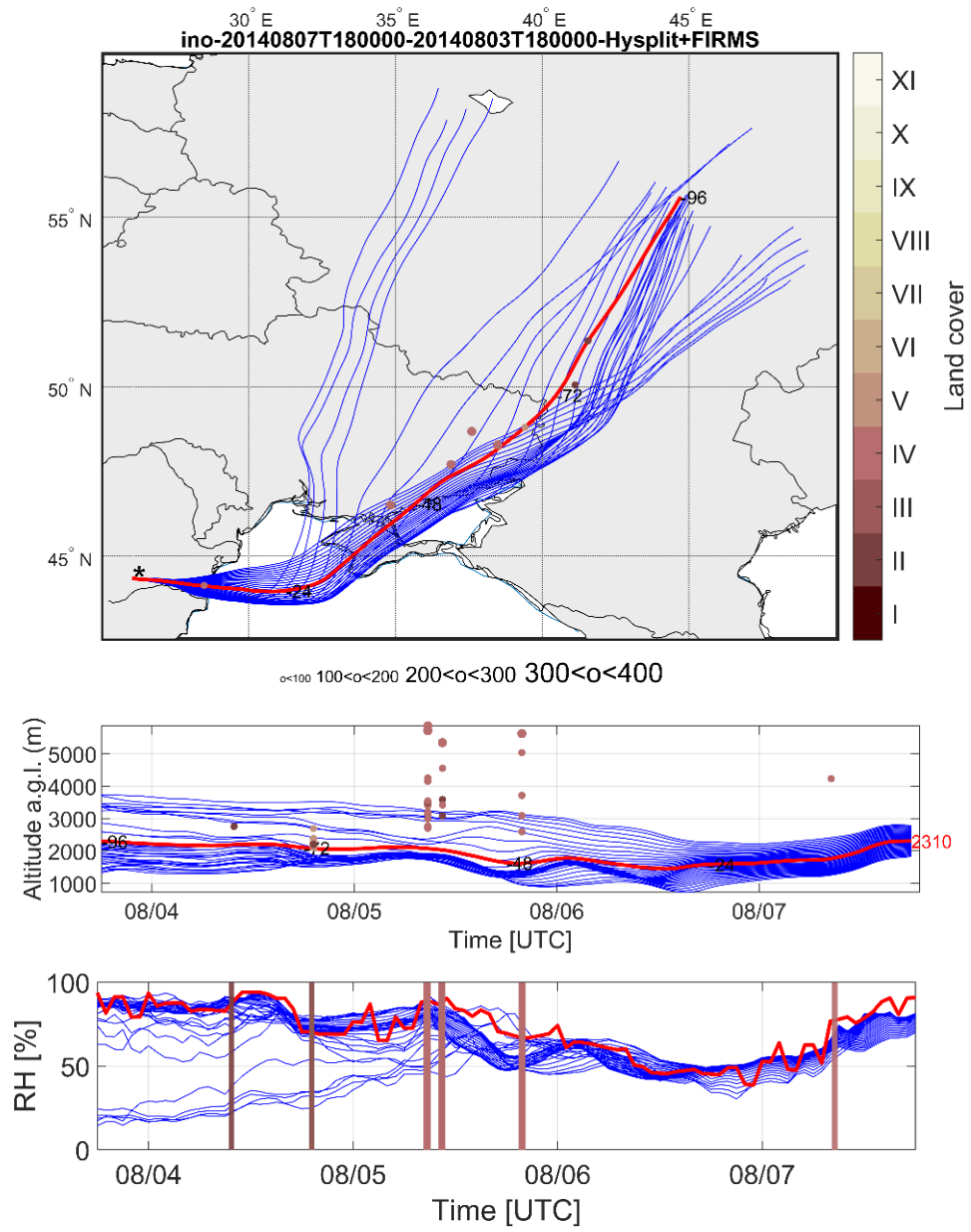
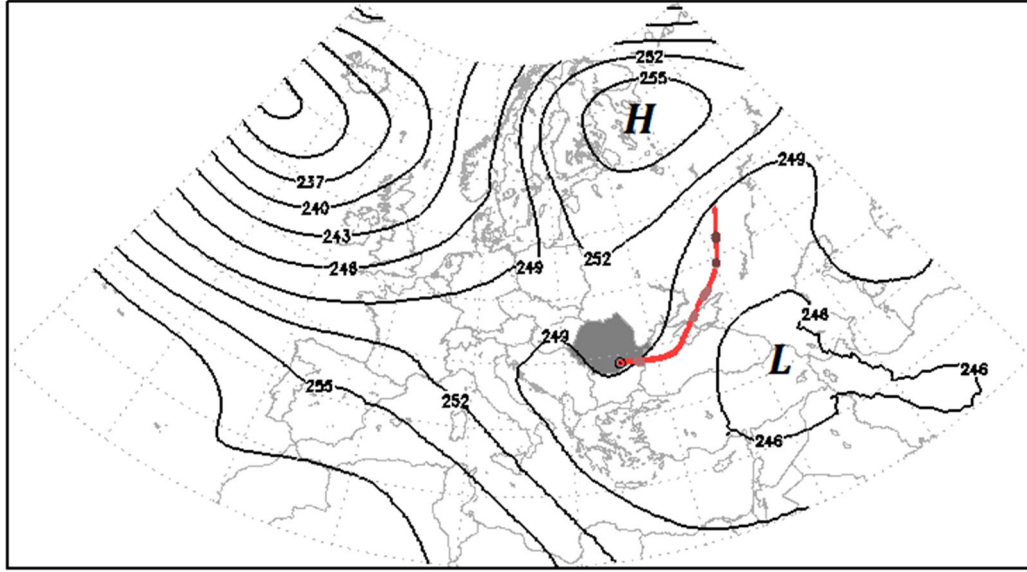


Figure S1. Case: 20140807 18:00 UTC for the layer located at 930 m - 1705 m. (a) Ensemble and mean HYSPLIT backtrajectories; The middle plot shows the trajectories altitudes versus time. The brown dots represent the fires' locations (upper plot) and their injection height (middle plot). The lower plot shows RH for both ensemble and mean trajectories. The location of the fires is shown by bars; (b) ERA5 reanalysis and (c) FEXPART source-receptor sensitivity map.

(a)



(b)



(c)

Biomass_burning

valid date: 2014080718

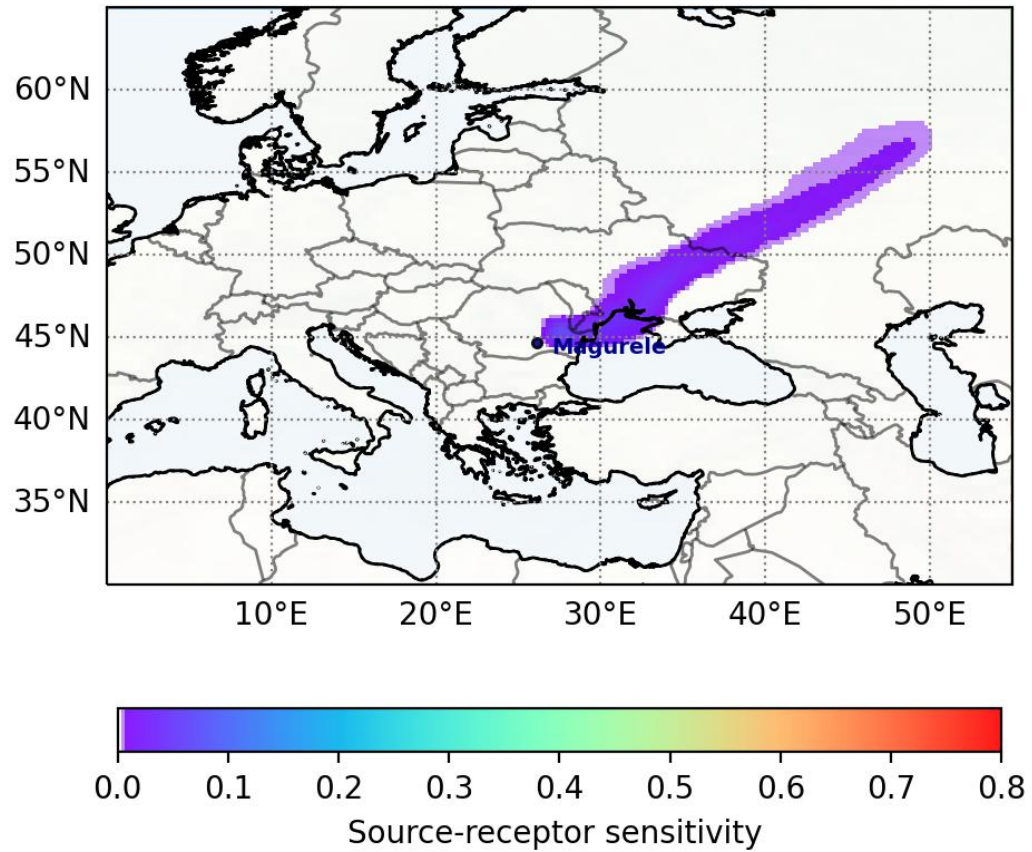
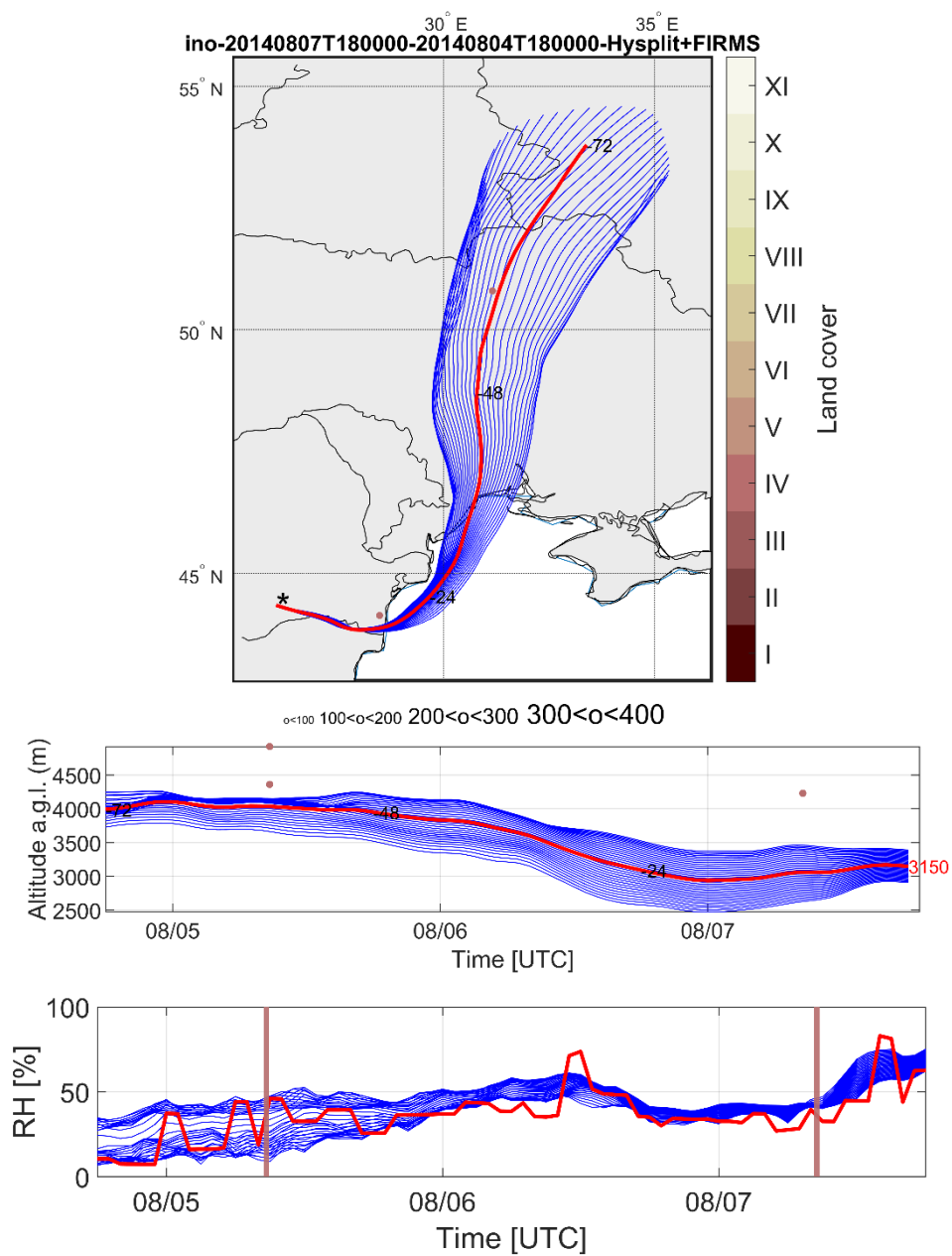
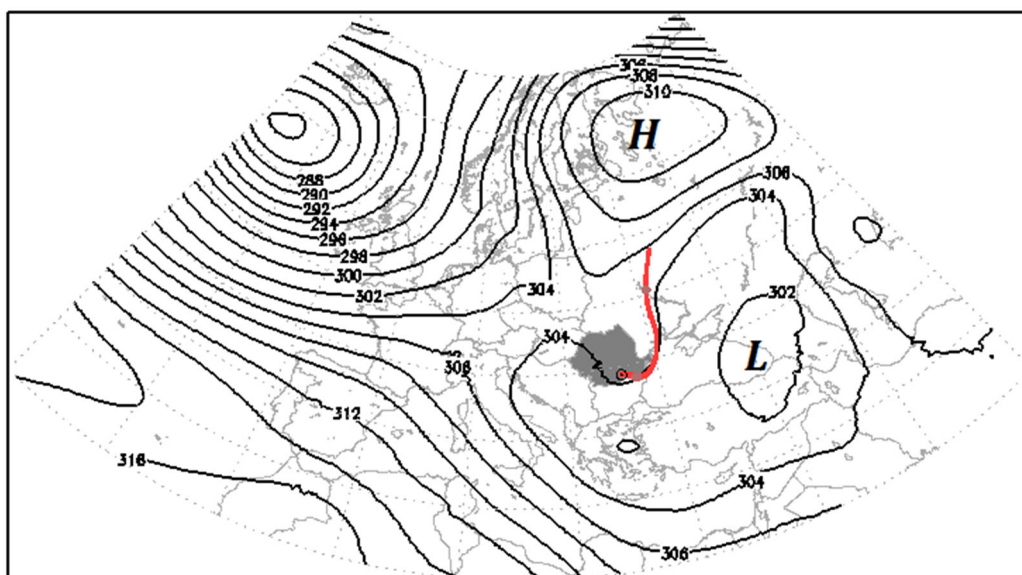


Figure S2. Case: 20140807 18:00 UTC for the layer located at 1830 m - 2790 m. (a) Ensemble and mean HYSPLIT backtrajectories; The middle plot shows the trajectories altitudes versus time. The brown dots represent the fires' locations (upper plot) and their injection height (middle plot). The lower plot shows RH for both ensemble and mean trajectories. The location of the fires is shown by bars; (b) ERA5 reanalysis and (c) FEXPART source-receptor sensitivity map.

(a)



(b)



(c)

Biomass_burning

valid date: 2014080718

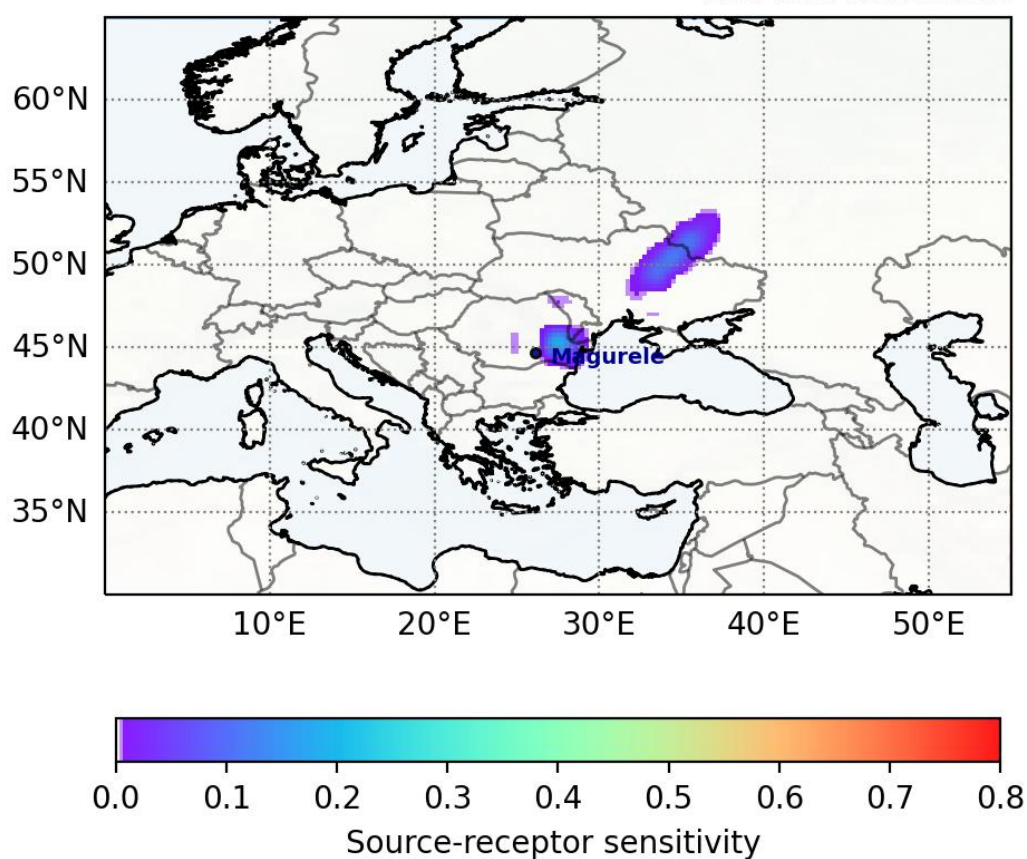


Figure S3. Case: 20140807 18:00 UTC for the layer located at 2910 m - 3390 m. (a) Ensemble and mean HYSPLIT backtrajectories; The middle plot shows the trajectories altitudes versus time. The brown dots represent the fires' locations (upper plot) and their injection height (middle plot). The lower plot shows RH for both ensemble and mean trajectories. The location of the fires is shown by bars; (b) ERA5 reanalysis and (c) FEXPART source-receptor sensitivity map.

(c)

Biomass_burning

valid date: 2014080719

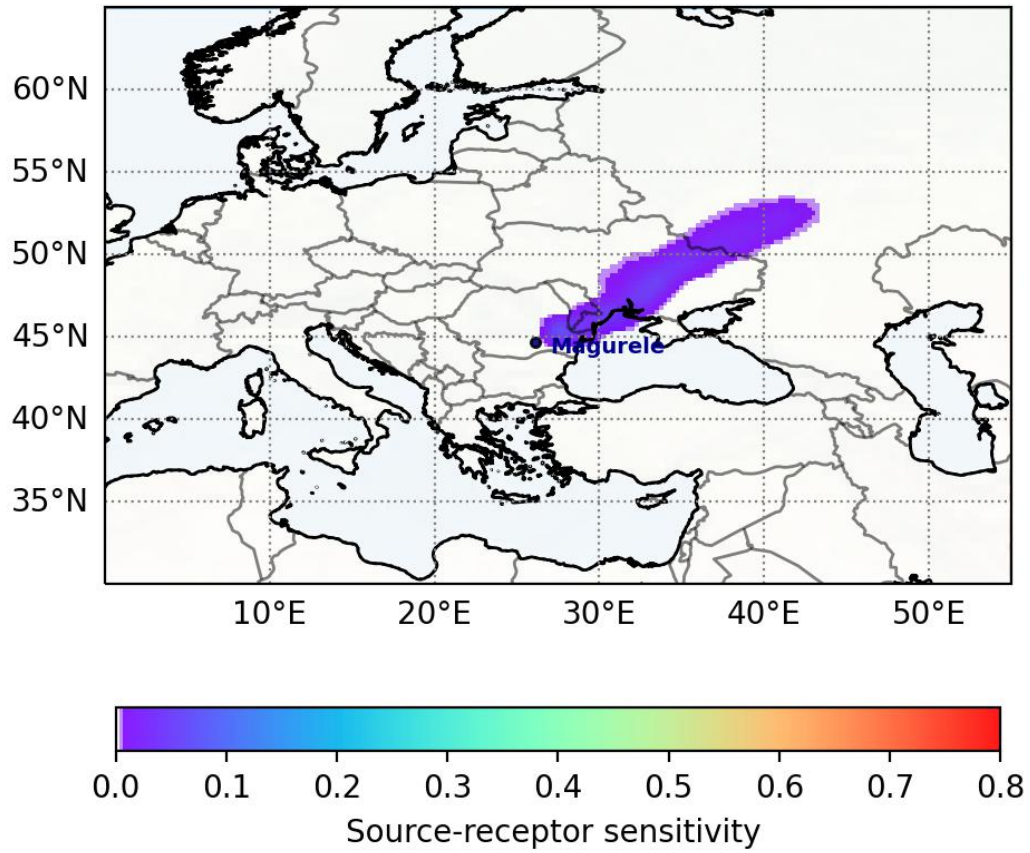
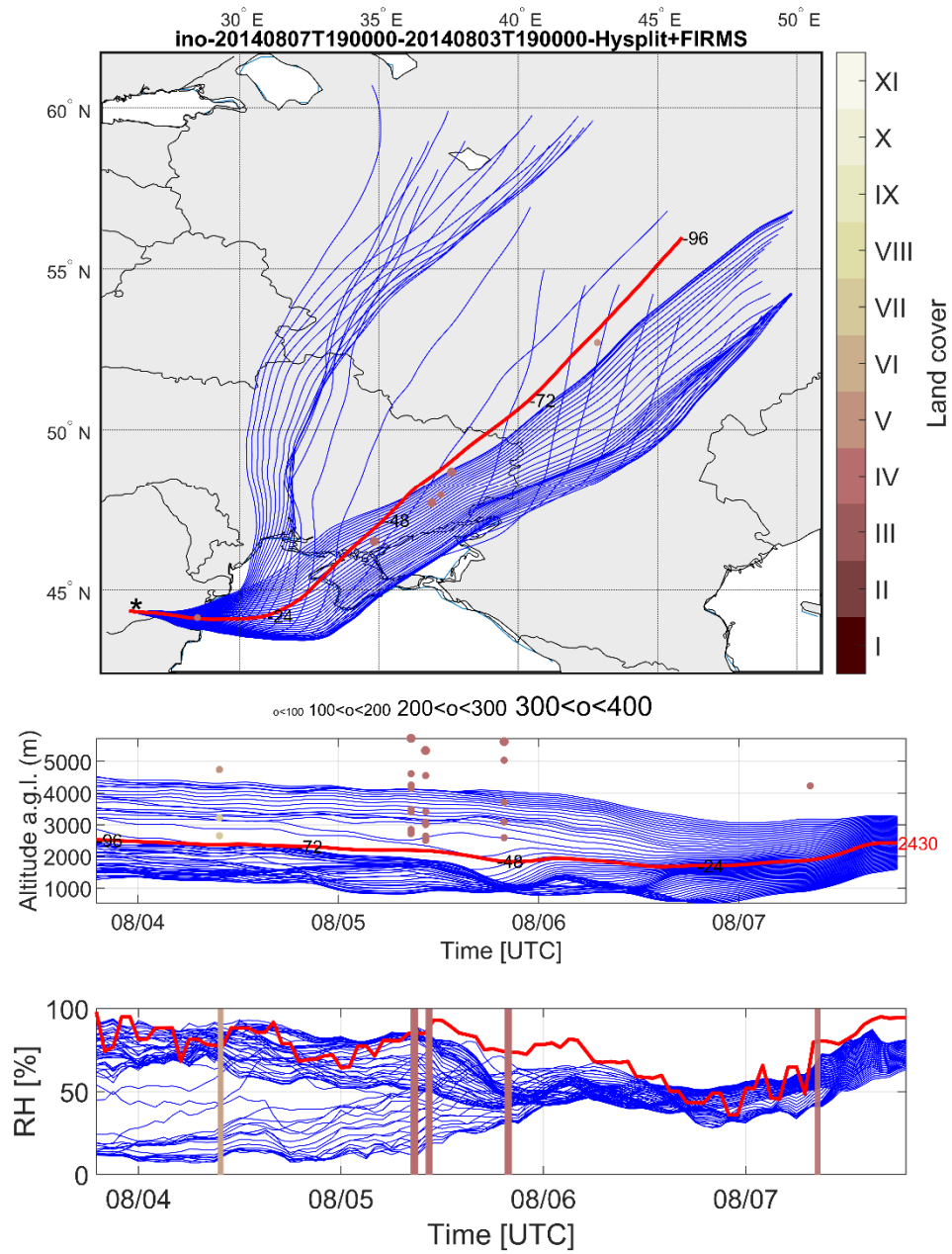
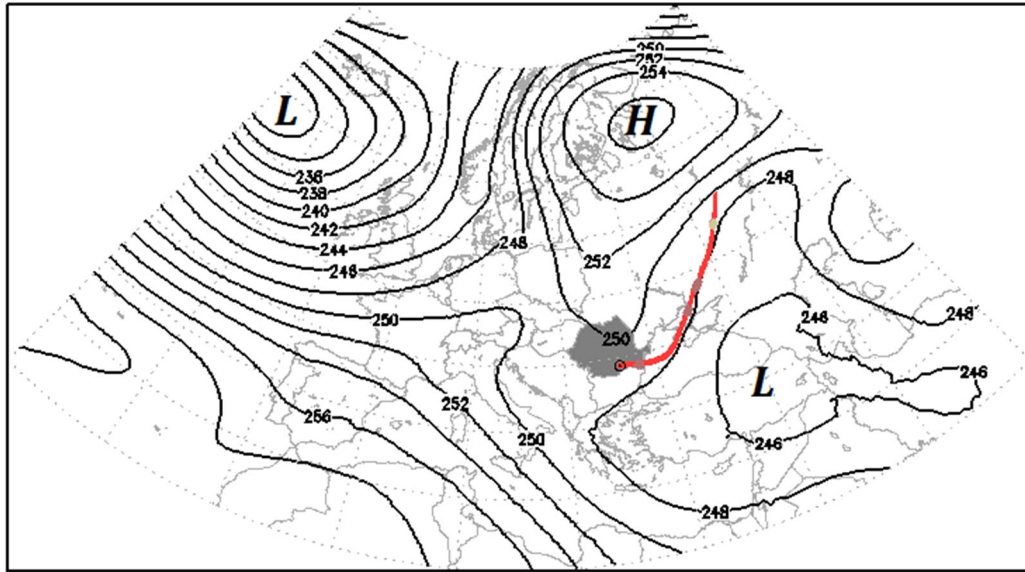


Figure S4. Case: 20140807 19:00 UTC for the layer located at 930 m - 1470 m. (a) Ensemble and mean HYSPLIT backtrajectories; The middle plot shows the trajectories altitudes versus time. The brown dots represent the fires' locations (upper plot) and their injection height (middle plot). The lower plot shows RH for both ensemble and mean trajectories. The location of the fires is shown by bars; (b) ERA5 reanalysis and (c) FEXPART source-receptor sensitivity map.

(a)



(b)



Biomass_burning

(c)

valid date: 2014080719

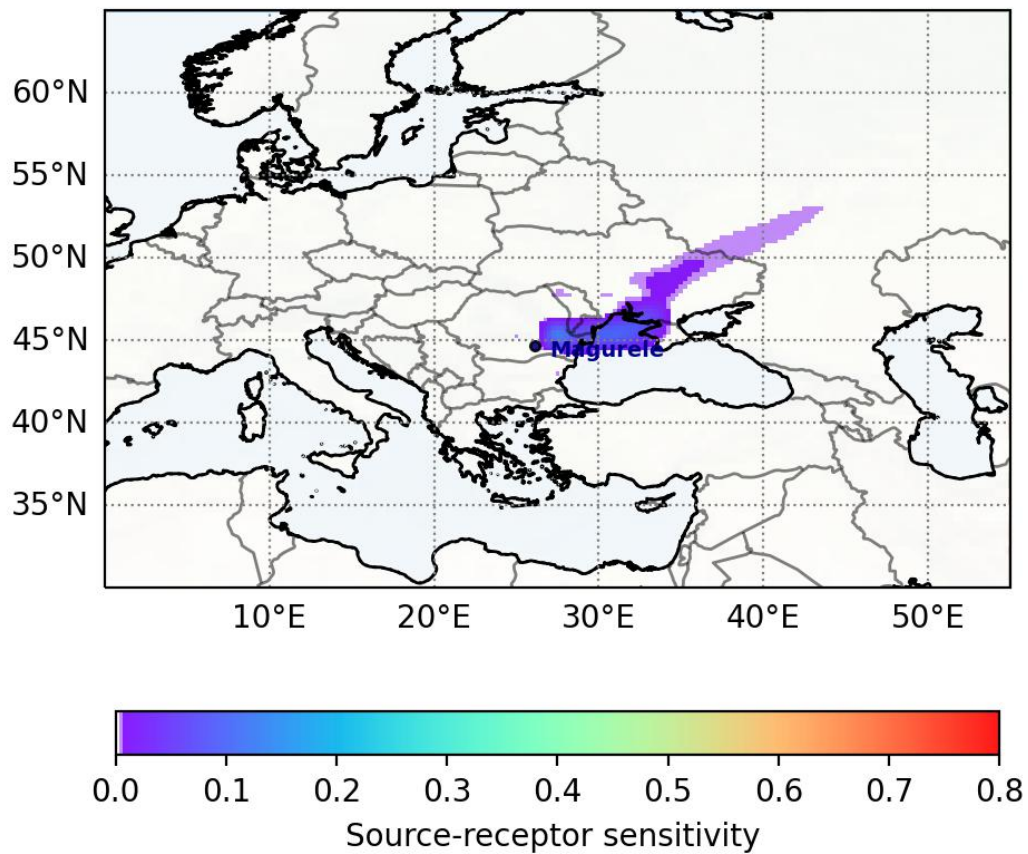
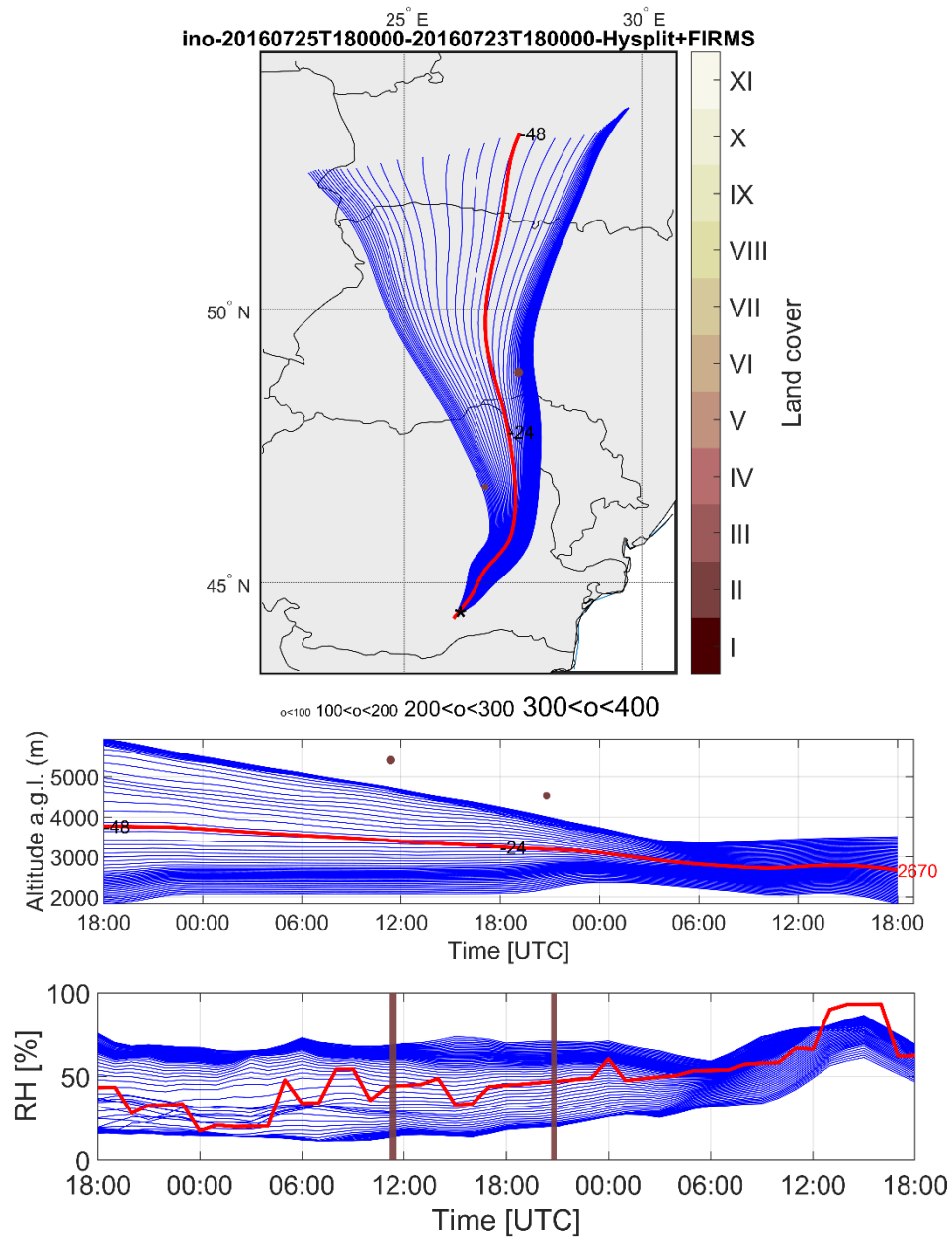
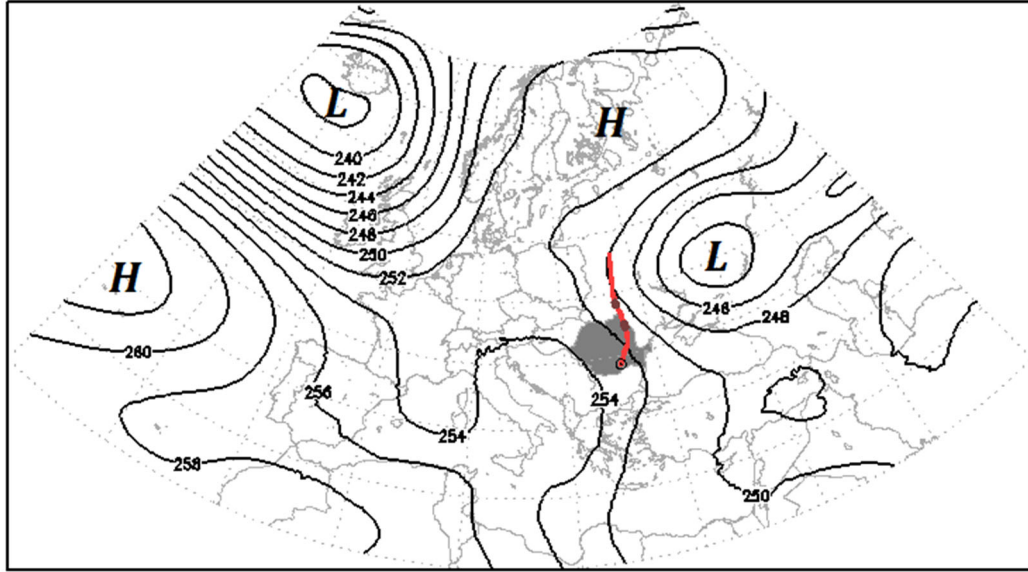


Figure S5. Case: 20140807 19:00 UTC for the layer located at 1590 m - 3270 m. (a) Ensemble and mean HYSPLIT backtrajectories; The middle plot shows the trajectories altitudes versus time. The brown dots represent the fires' locations (upper plot) and their injection height (middle plot). The lower plot shows RH for both ensemble and mean trajectories. The location of the fires is shown by bars; (b) ERA5 reanalysis and (c) FEXPART source-receptor sensitivity map.

(a)



(b)



(c)

Biomass_burning

valid date: 2016072518

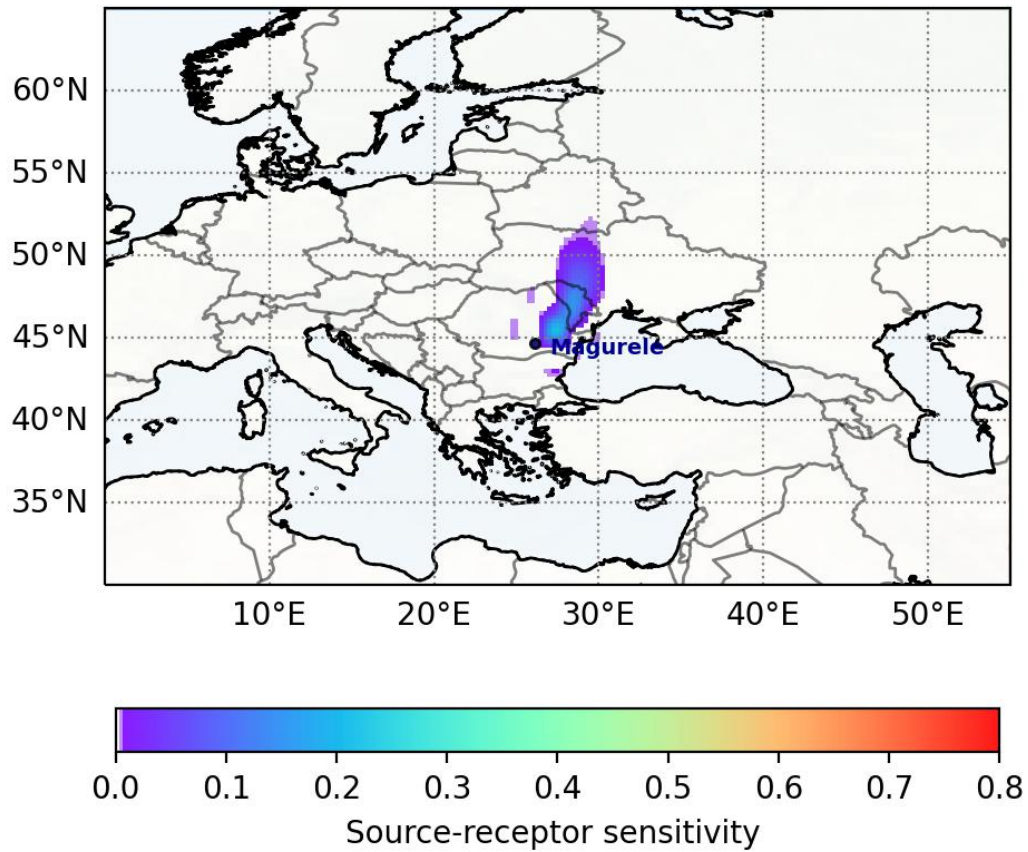
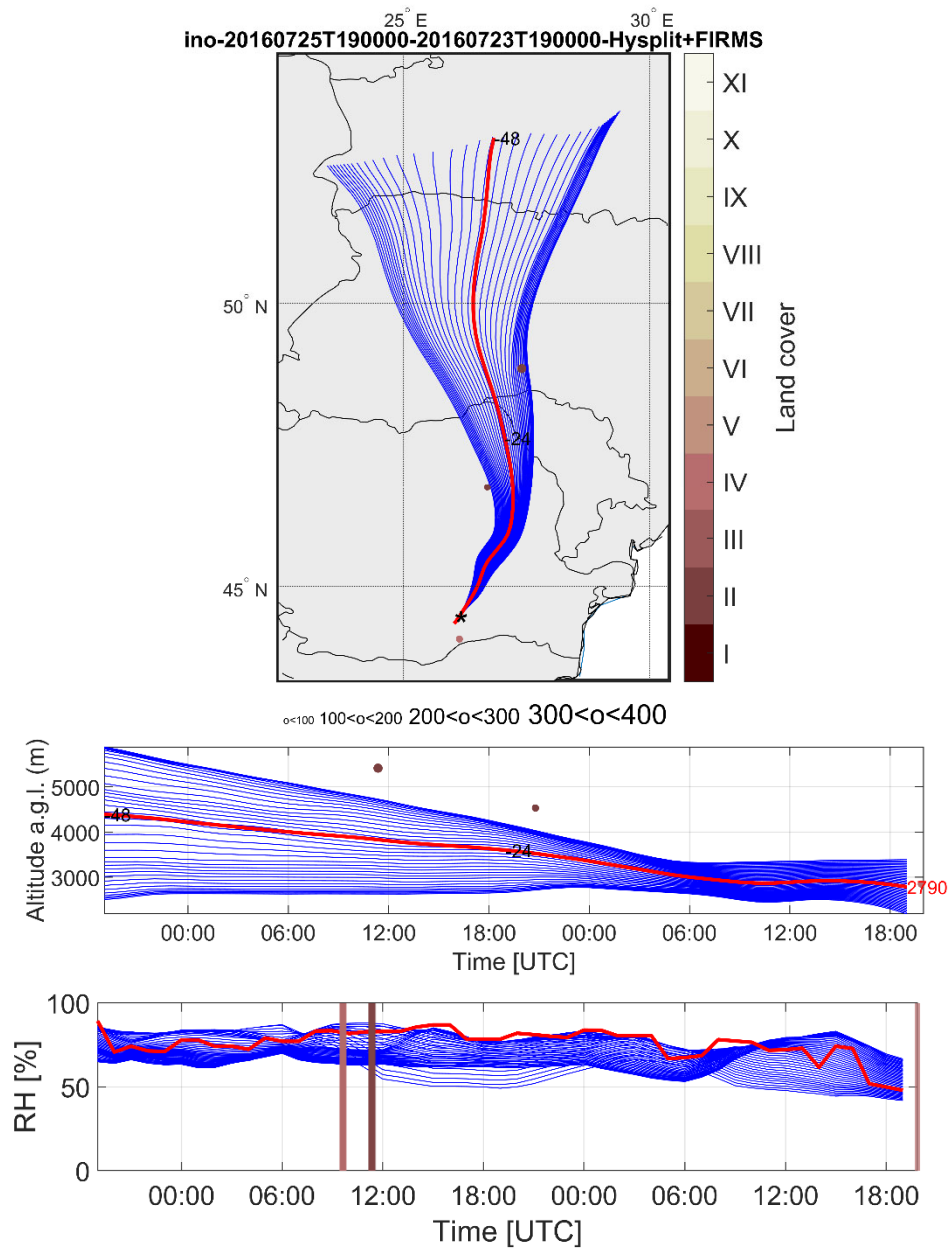
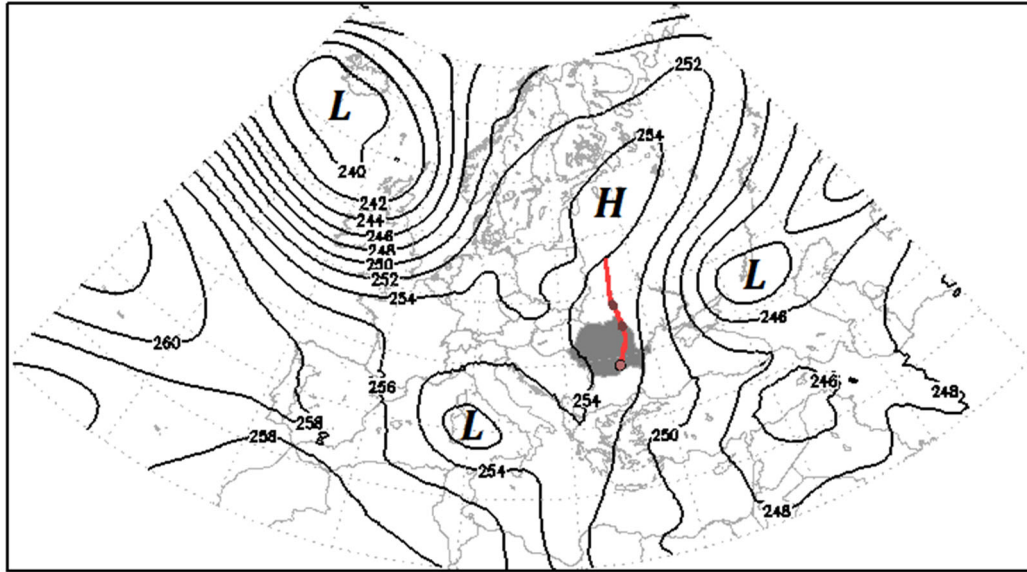


Figure S6. Case: 20160725 18:00 UTC for the layer located at 1830 m - 3510 m. (a) Ensemble and mean HYSPLIT backtrajectories; The middle plot shows the trajectories altitudes versus time. The brown dots represent the fires' locations (upper plot) and their injection height (middle plot). The lower plot shows RH for both ensemble and mean trajectories. The location of the fires is shown by bars; (b) ERA5 reanalysis and (c) FEXPART source-receptor sensitivity map.

(a)



(b)



(c)

Biomass_burning

valid date: 2016072519

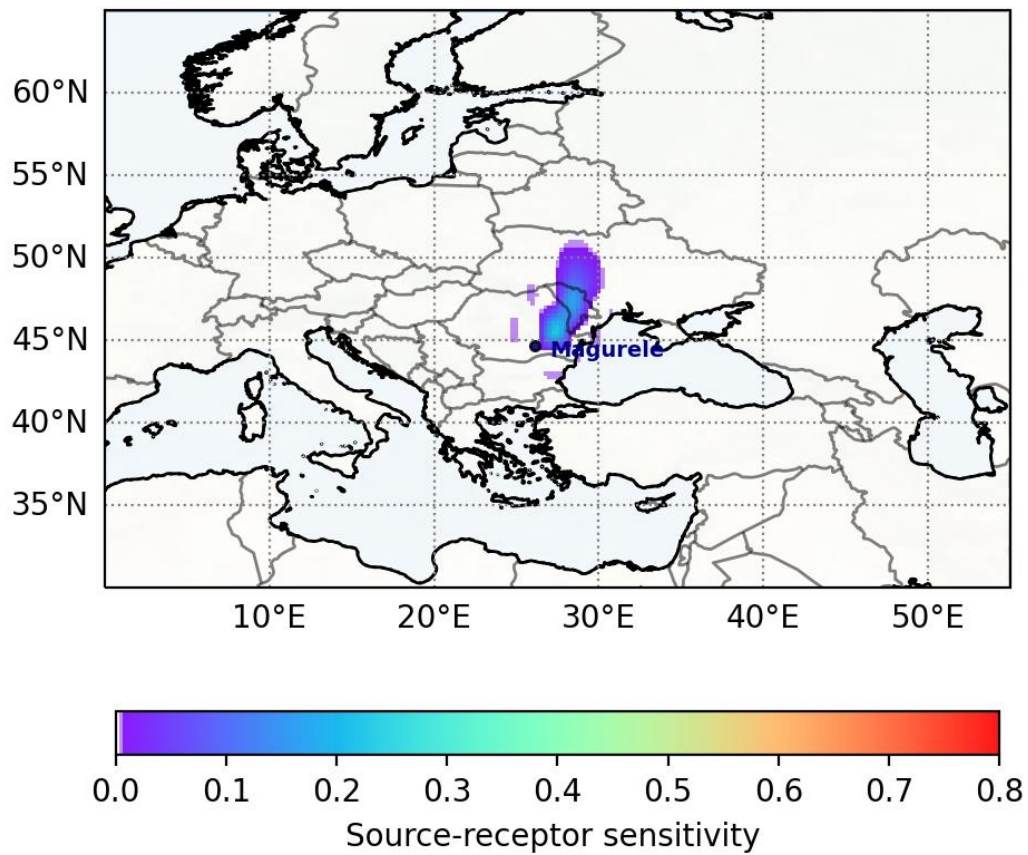
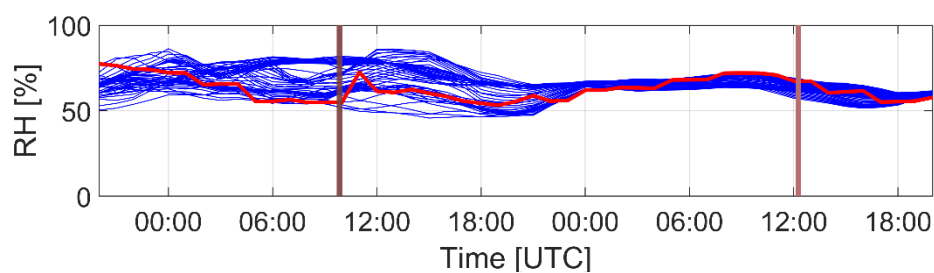
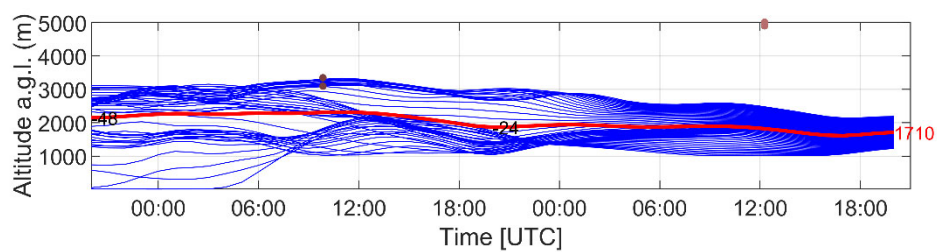
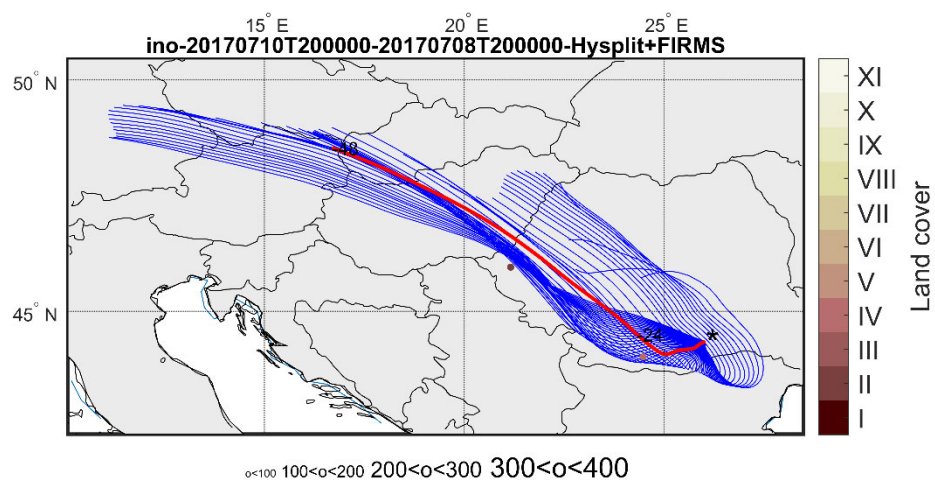
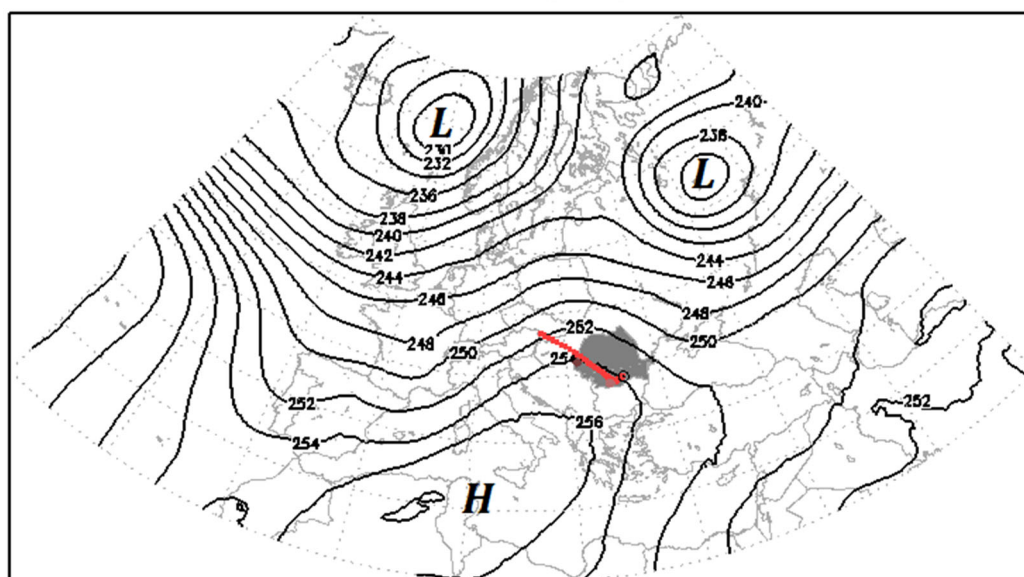


Figure S7. Case: 20160725 19:00 UTC for the layer located at 2190 m - 3390 m. (a) Ensemble and mean HYSPLIT backtrajectories; The middle plot shows the trajectories altitudes versus time. The brown dots represent the fires' locations (upper plot) and their injection height (middle plot). The lower plot shows RH for both ensemble and mean trajectories. The location of the fires is shown by bars; (b) ERA5 reanalysis and (c) FEXPART source-receptor sensitivity map.

(a)



(b)



(c)

Biomass_burning

valid date: 2017071020

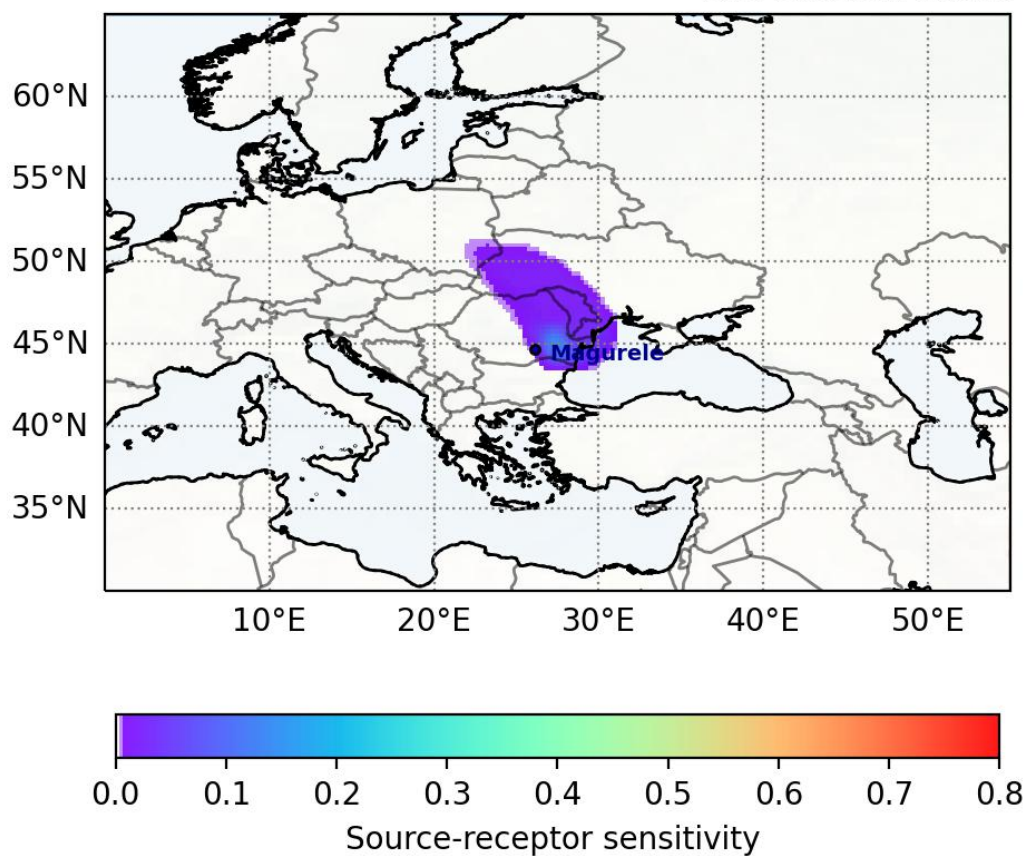
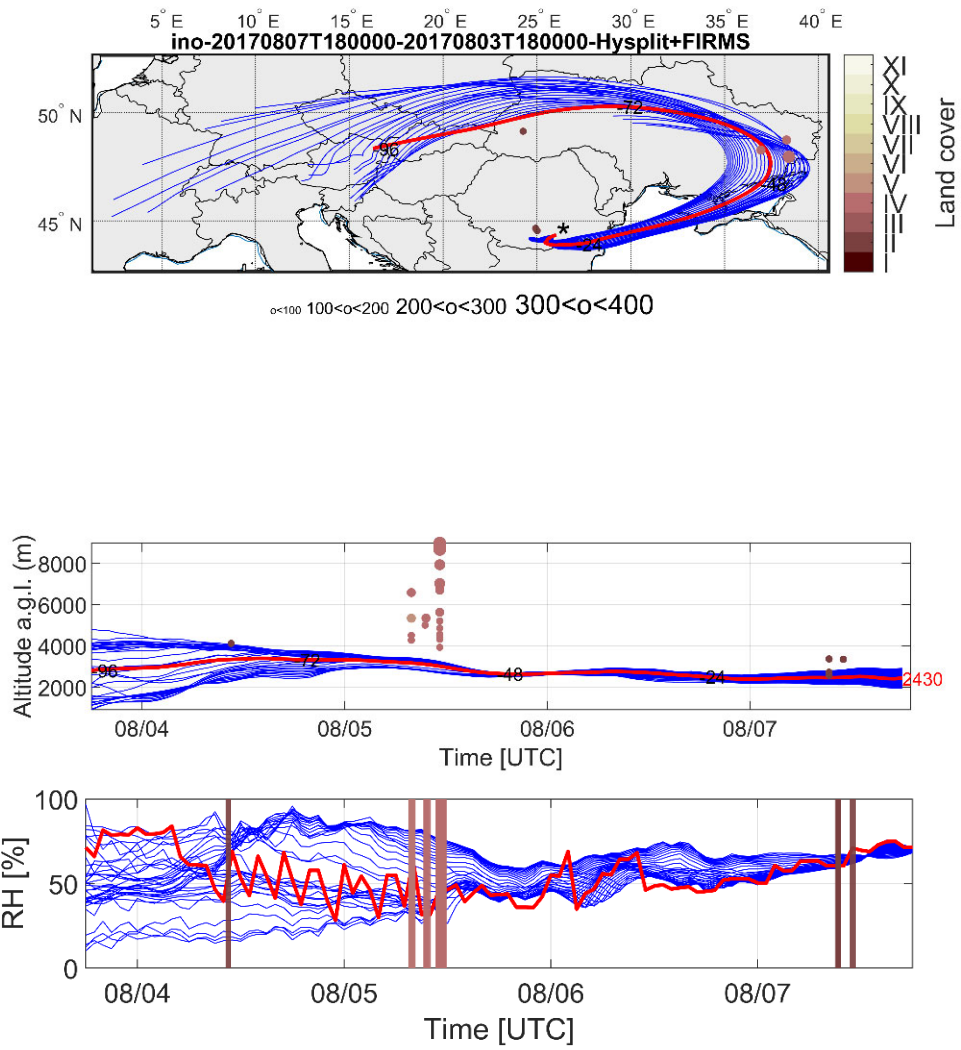
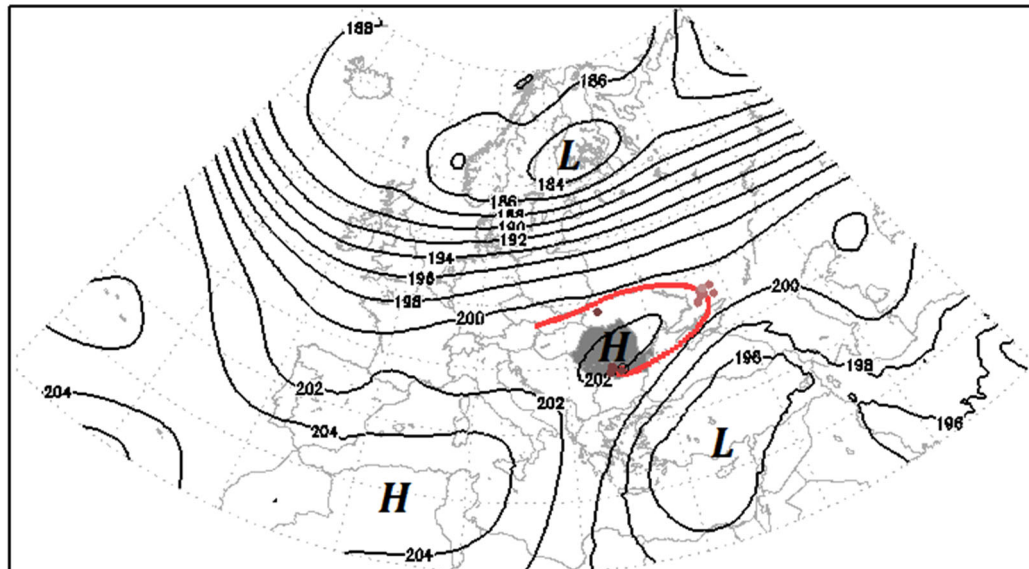


Figure S8. Case: 20170710 20:00 UTC for the layer located at 1230 m - 2190 m. (a) Ensemble and mean HYSPLIT backtrajectories; The middle plot shows the trajectories altitudes versus time. The brown dots represent the fires' locations (upper plot) and their injection height (middle plot). The lower plot shows RH for both ensemble and mean trajectories. The location of the fires is shown by bars; (b) ERA5 reanalysis and (c) FEXPART source-receptor sensitivity map.

(a)



(b)



(c)

Biomass_burning

valid date: 2017080718

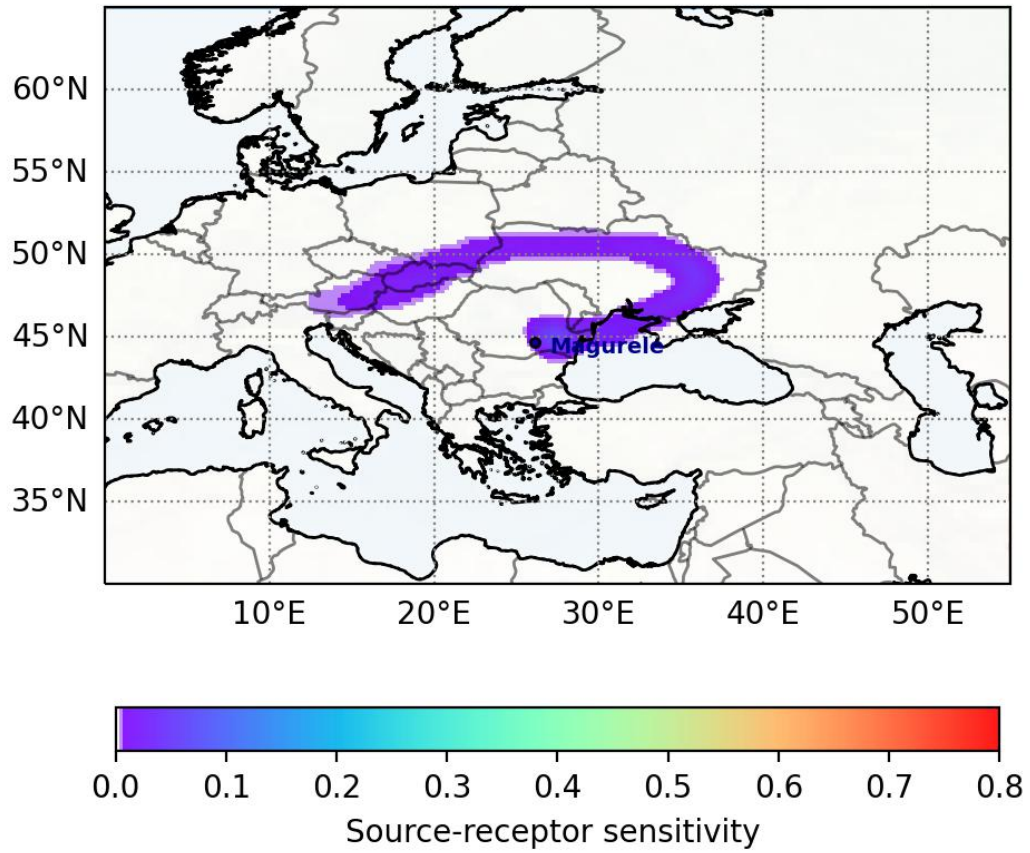
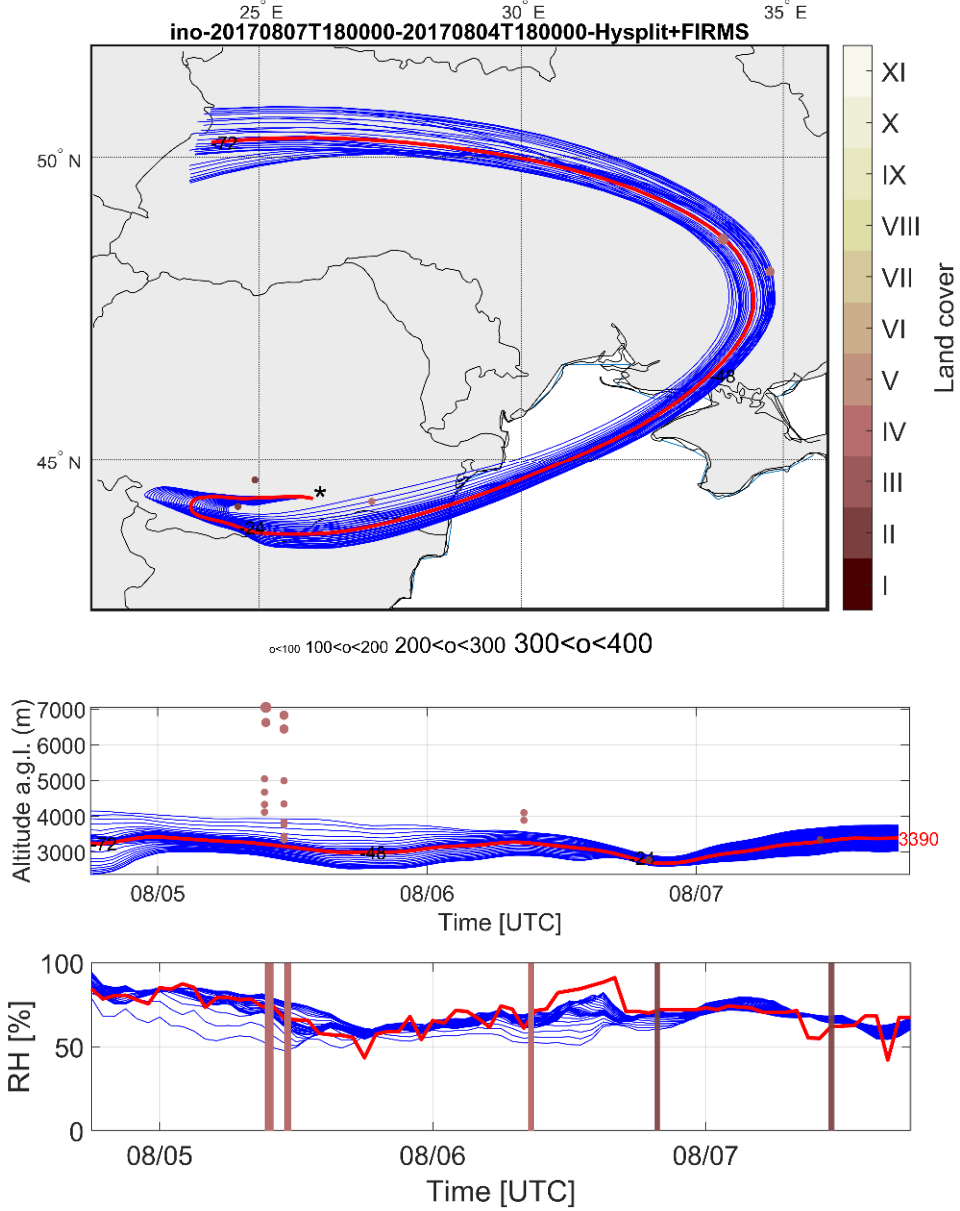
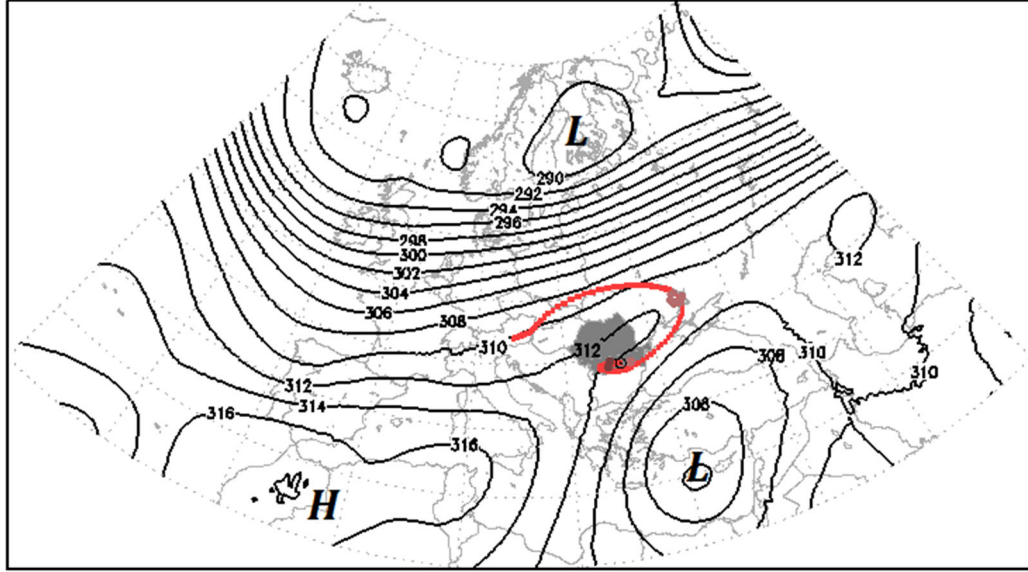


Figure S9. Case: 20170807 18:00 UTC for the layer located at 1950 m - 2910 m. (a) Ensemble and mean HYSPLIT backtrajectories; The middle plot shows the trajectories altitudes versus time. The brown dots represent the fires' locations (upper plot) and their injection height (middle plot). The lower plot shows RH for both ensemble and mean trajectories. The location of the fires is shown by bars; (b) ERA5 reanalysis and (c) FEXPART source-receptor sensitivity map.

(a)



(b)



(c)

Biomass_burning

valid date: 2017080718

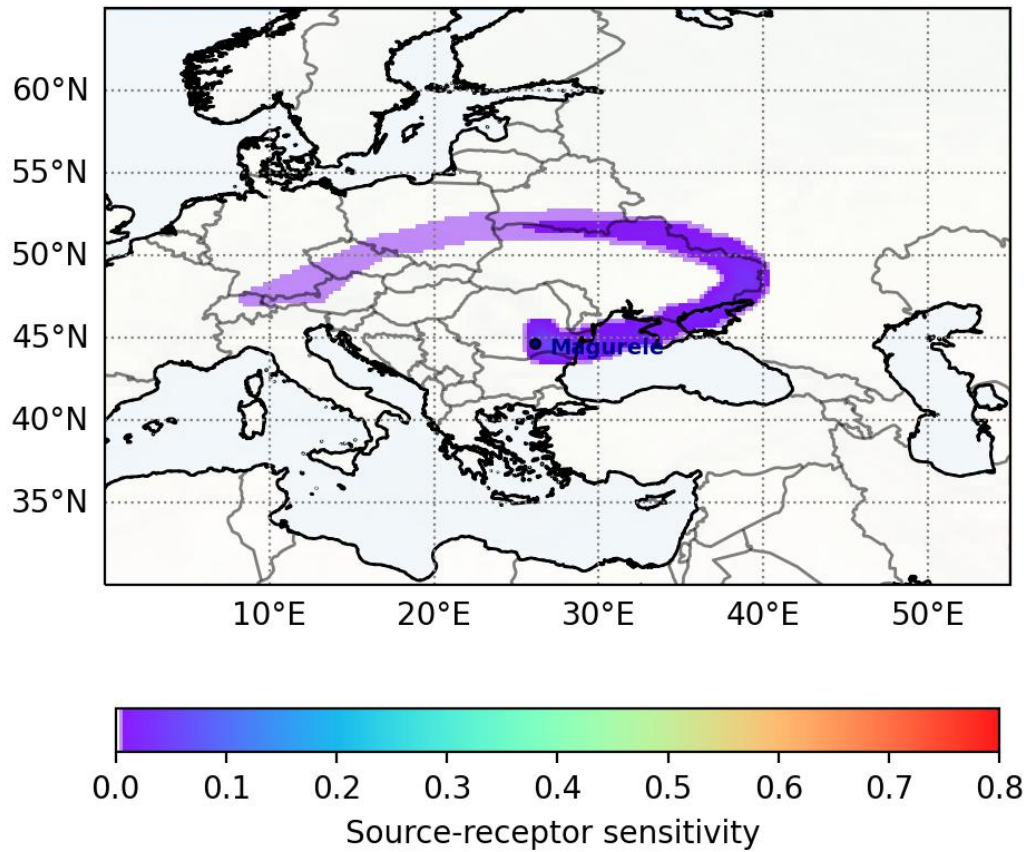


Figure S10. Case: 20170807 18:00 UTC for the layer located at 3030 m - 3750 m. (a) Ensemble and mean HYSPLIT backtrajectories; The middle plot shows the trajectories altitudes versus time. The brown dots represent the fires' locations (upper plot) and their injection height (middle plot). The lower plot shows RH for both ensemble and mean trajectories. The location of the fires is shown by bars; (b) ERA5 reanalysis and (c) FEXPART source-receptor sensitivity map.

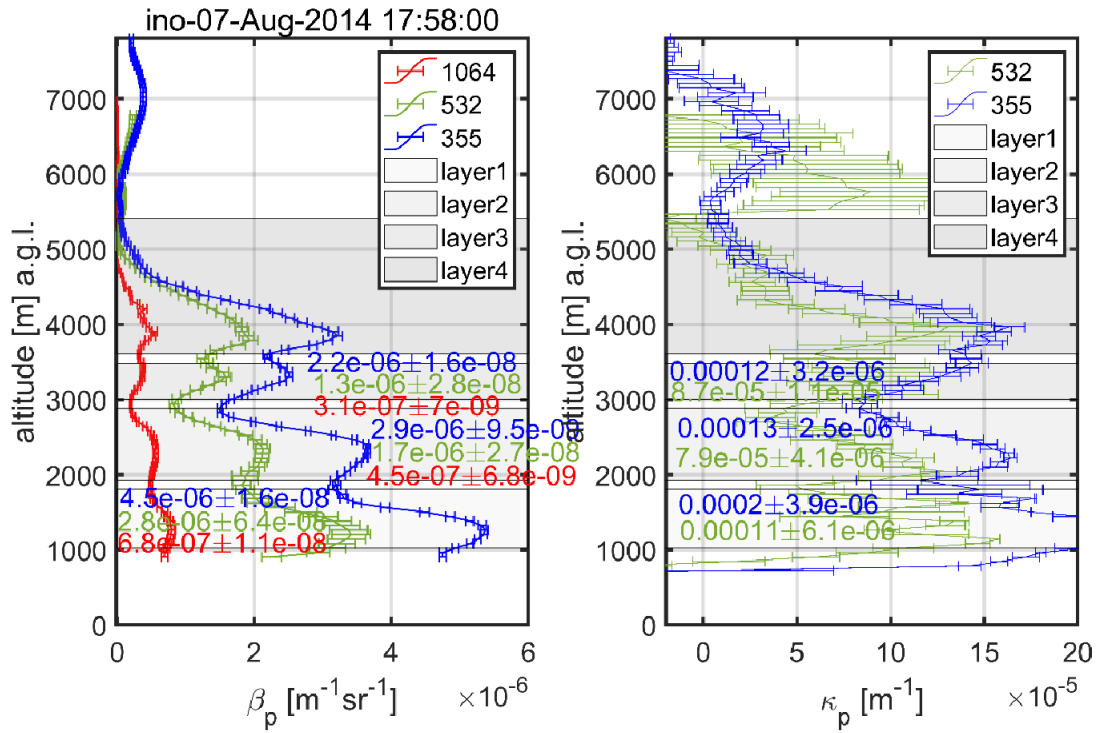


Figure S11. Lidar averaged profiles over 17:45 – 18:11 UTC on 7 August 2014: aerosol backscatter coefficient at 355 nm, 532 nm and 1064 nm (left) and aerosol extinction coefficient at 355 nm and 532 nm (right). The layers are marked (gray shaded) while the mean values of the optical properties in the layer are shown with the corresponding color for each parameter. The first three layers are analyzed. The corresponding backtrajectories for the three layers are shown in Figures S1-S3.

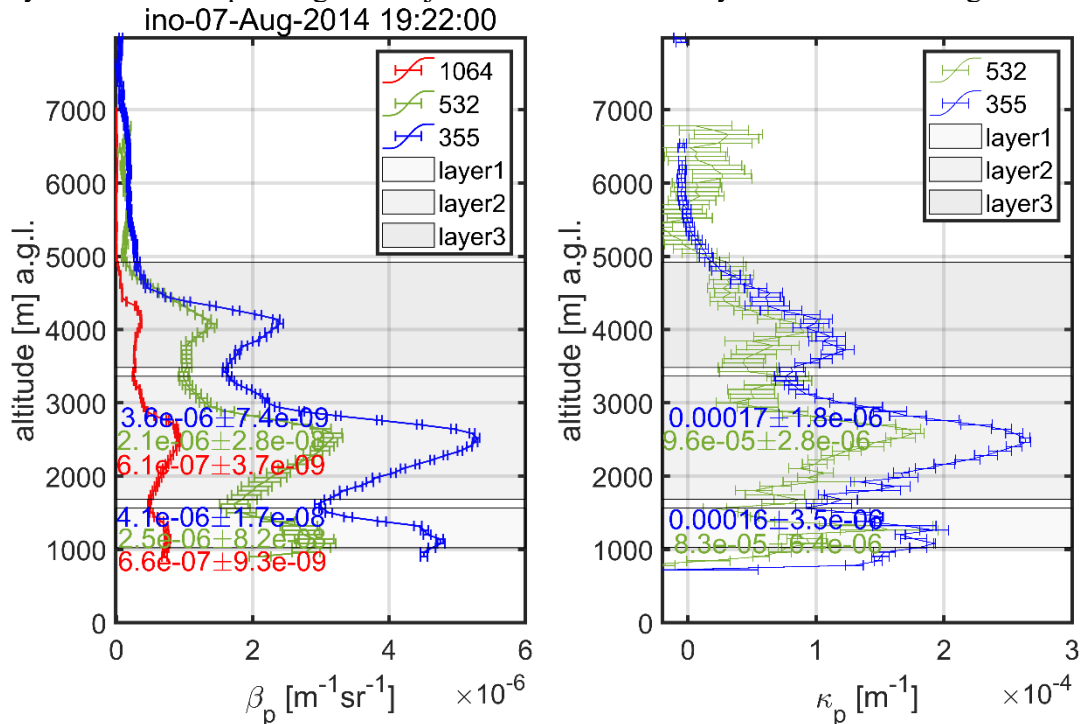


Figure S12. Lidar averaged profiles over 19:07 – 19:37 UTC on 7 August 2014: aerosol backscatter coefficient at 355 nm, 532 nm and 1064 nm (left) and aerosol extinction coefficient at 355 nm and 532 nm (right). The layers are marked (gray shaded) while the mean values of the optical properties in the layer are shown with the corresponding color for each parameter. The first two layers are analyzed. The corresponding backtrajectories for the two layers are shown in Figures S4-S5.

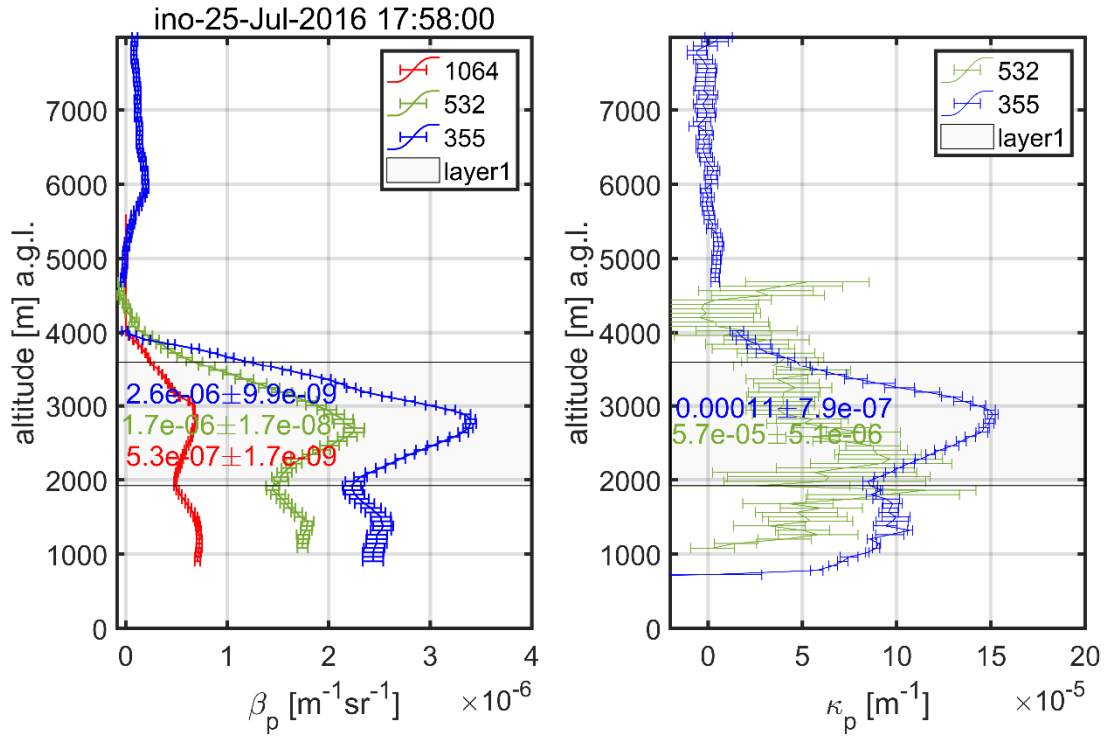


Figure S13. Lidar averaged profiles over 17:28 – 18:28 UTC on 25 July 2016: aerosol backscatter coefficient at 355 nm, 532 nm and 1064 nm (left) and aerosol extinction coefficient at 355 nm and 532 nm (right). The layer is marked (gray shaded) while the mean values of the optical properties in the layer are shown with the corresponding color for each parameter. The corresponding backtrajectory for the layer is shown in Figure S6.

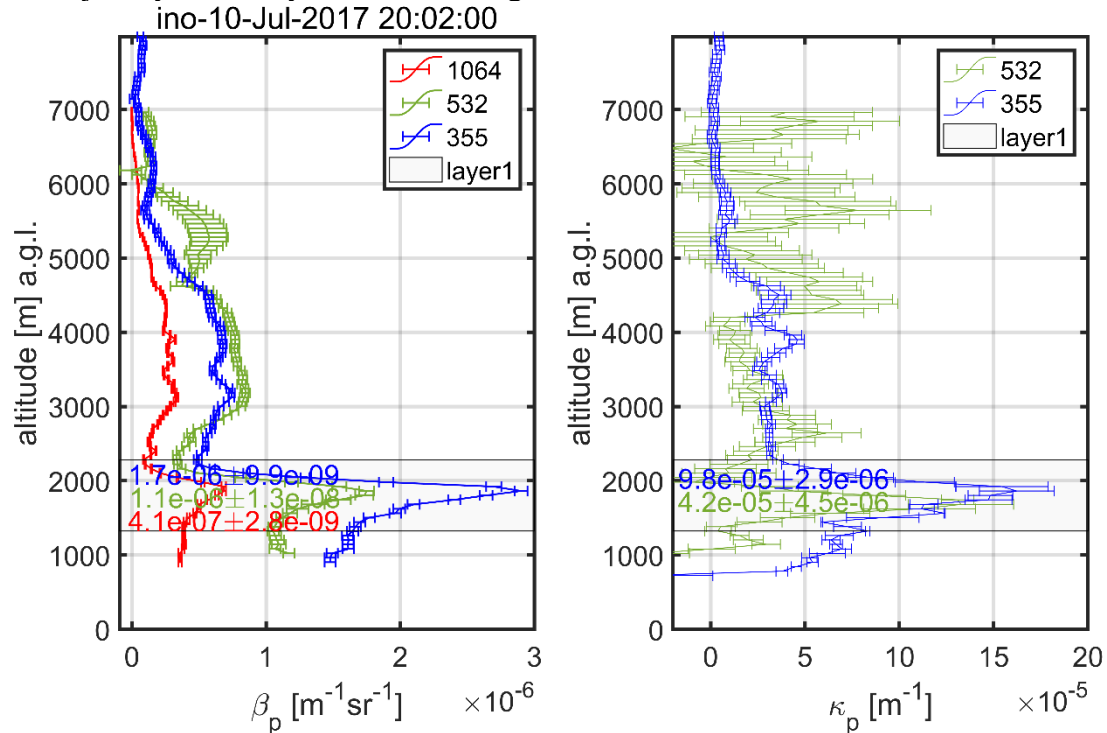


Figure S14. Lidar averaged profiles over 19:55 – 20:09 UTC on 10 July 2017: aerosol backscatter coefficient at 355 nm, 532 nm and 1064 nm (left) and aerosol extinction coefficient at 355 nm and 532 nm (right). The layer is marked (gray shaded) while the mean values of the optical properties in the layer are shown with the corresponding color for each parameter. The corresponding backtrajectory for the layer is shown in Figure S8.

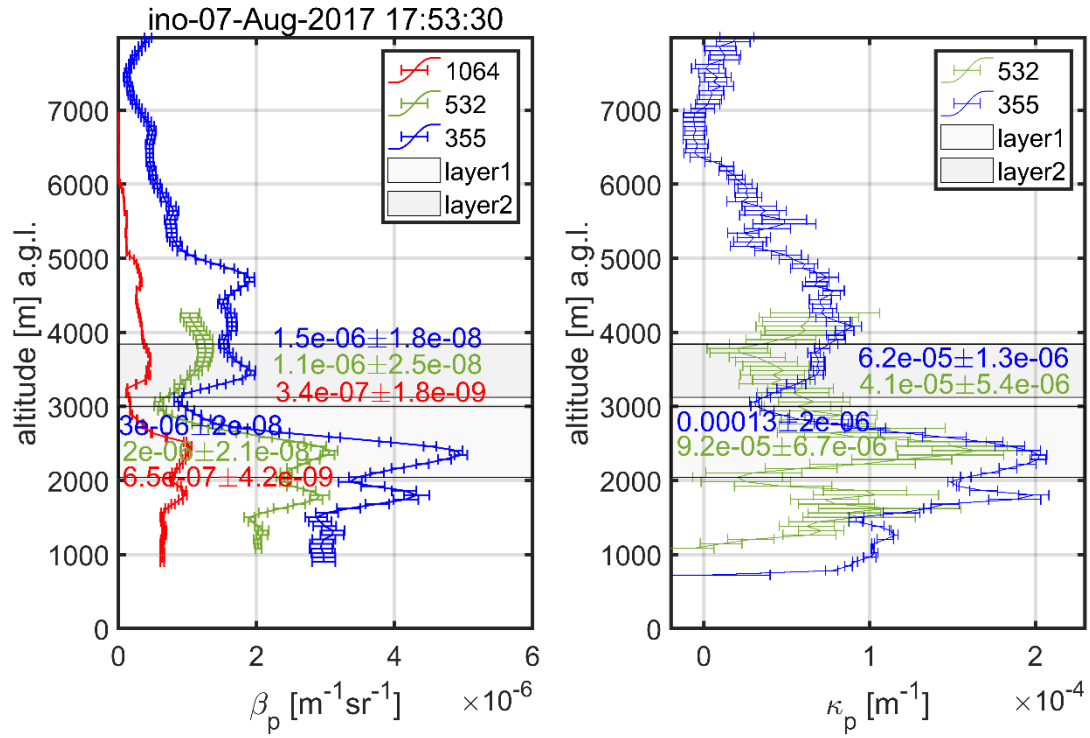


Figure S15. Lidar averaged profiles over 17:26 – 18:21 UTC on 7 August 2017: aerosol backscatter coefficient at 355 nm, 532 nm and 1064 nm (left) and aerosol extinction coefficient at 355 nm and 532 nm (right). The layers are marked (gray shaded) while the mean values of the optical properties in the layer are shown with the corresponding color for each parameter. The corresponding backtrajectories for the two layers are shown in Figures S9-S10.